

## EFFECTS OF DIFFERENT COATING TREATMENTS ON PHYSICAL PARAMETERS OF MANGO (*MANGIFERA INDICA* L.) CV. AMRAPALI

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### ABSTRACT

*An investigation was carried out at Post Graduate Laboratory, Department of Horticulture, B. A. College of Agriculture, An and Agricultural University, An and during summer season in the year 2016 to study the “effect of different coating treatments on storage behavior and shelf-life of mango (*Mangifera indica* L.) cv. Amrapali. The experiment was framed in Completely Randomized Design with nine treatments and a control. The result revealed that fruits coated with waxol 6% recorded significantly the lowest physiological loss in weight with the highest firmness and maximum average number of days taken for ripening whereas, the fruits coated with aloe vera gel 60% recorded maximum retention of fruit marketability with minimum spoilage and there by extending the shelf-life of the fruits.*

**KEY WORDS:** *Mango, Waxol, Aloe vera and Gel, Sago*

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### INTRODUCTION

Mango (*Mangifera indica* L.) is the most important fruit crop in India having a great cultural, socio-economic and religious significance since the ancient times. It is intimately associated with the history of Indian agriculture and civilization and it enjoys a royal status in the country when compared to the other growing places. It possesses delicious fruit quality with richness in vitamins and minerals, accessibility to common man, liking by the masses and coverage of large area under cultivation ranging from the near coastal areas to the Himalayan foot hills, mango has been assigned the status of the ‘king of fruits’ in India. Among the promising mango hybrid Amrapali is one of the most suitable varieties for inter as well as overseas markets and processing industries. It is originated as a hybrid from the cross Dashehari x Neelum made in 1965 at the Division of Fruits and Horticultural Technology, Indian Agricultural Research Institute, New Delhi (India).

Application of various films and coatings modify the fruit atmosphere at micro level, reduce weight loss during transport and storage and extends shelf-life. It can also reduce growth of micro organisms. Coating provides semi permeable barrier against oxygen, carbon dioxide, moisture and volatiles. Wax acts as a barrier of free movement of water, air and oxygen. Covering with additional layer of wax on the fruit surface by use of wax emulsions like waxol has been reported to have beneficial effect in extending shelf-life of several fruits. The use of aloe vera gel based edible coatings have been shown to prevent loss of moisture and firmness, control respiration rate, development and maturation, delay oxidative browning and reduce microorganism proliferation in fruits. Sago starch based edible films have good qualities like odourless, tasteless and colourless. Therefore, this experiment has been proposed to study the effect of wax, aloe vera gel and sago on physical parameters of mango cv. Amrapali

## MATERIALS AND METHODS

An investigation was carried out at Post Graduate Laboratory, Department of Horticulture, B. A. College of Agriculture, Anand Agricultural University, and Anand during summer season in the year 2016. Completely Randomized Block Design was followed in the experiment with nine treatments and a control. Following post-harvest treatments were imposed on matured fruits as dipping treatment for different duration.

**T<sub>1</sub>:** Dipping in waxol @ 2 % for 1 minute

**T<sub>2</sub>:** Dipping in waxol @ 4 % for 1 minute

**T<sub>3</sub>:** Dipping in waxol @ 6 % for 1 minute

**T<sub>4</sub>:** Dipping in aloe vera gel @ 20 % for 45 minutes

**T<sub>5</sub>:** Dipping in aloe vera gel @ 40 % for 45 minutes

**T<sub>6</sub>:** Dipping in aloe vera gel @ 60 % for 45 minutes

**T<sub>7</sub>:** Dipping in sago starch @ 10 % for 5 minutes

**T<sub>8</sub>:** Dipping in sago starch @ 20 % for 5 minutes

**T<sub>9</sub>:** Dipping in sago starch @ 30 % for 5 minutes

**T<sub>10</sub>:** Control

Coated and uncoated fruits were kept in CFB boxes at ambient temperature. Each treatment was allotted two boxes in each repetition and each box contained 10 fruits.

## RESULTS AND DISCUSSIONS

The experimental results revealed that among the different coating treatments waxol 6% and aloe vera gel 60% had a significant influence on the different physical characters of mango.

The fruits coated with waxol 6% (T<sub>3</sub>) had significantly minimum physiological loss in weight (12.36%), followed by T<sub>2</sub> (13.90%), whereas the fruits under control condition had maximum physiological loss in weight (27.80%) up to 16<sup>th</sup> day of storage. The reduced rate of weight loss in waxol coated fruits might be due to wax coating, which acts as barrier between inner and outer environment of fruit. 8<sup>th</sup>, 12<sup>th</sup> and 16<sup>th</sup> day of storage, respectively. The improved marketability of the aloe vera gel coated fruits could be attributed to its effect on preventing moisture, firmness, maturation and normal colour development. This result is in conformity with the results of Ahmed *et al.* (2009) in nacterines.

The spoilage percent of mango fruits was increased as the storage period increased regardless of the treatments. Fruits treated with aloe vera gel 20%, 40%, 60% and sago 30% recorded minimum spoilage *i.e.* 0.21% in each at 8<sup>th</sup> day of storage while, coating with aloe vera gel 60% (T<sub>6</sub>) showed minimum spoilage *i.e.* 0.50% and 0.78% at 12<sup>th</sup> and 16<sup>th</sup> day of storage, respectively which was at par with T<sub>4</sub> (0.65 & 0.85%), T<sub>5</sub> (0.61 & 0.82%), T<sub>7</sub> (0.68 & 0.96%), T<sub>8</sub> (0.58 & 0.89%) and T<sub>9</sub> (0.54 & 0.85%) on 12<sup>th</sup> and 16<sup>th</sup> day of storage, respectively. However, fruits coated with waxol 6% (T<sub>3</sub>) recorded significantly maximum spoilage *i.e.* 0.45, 0.61, 0.89 and 1.20% at 4<sup>th</sup>, 8<sup>th</sup>, 12<sup>th</sup> and 16<sup>th</sup> day of storage, respectively. The spoilage might be either due to increased microbes or CO<sub>2</sub>. The present investigation is in conformity with the results reported by Paladines *et al.* (2014) in some stone fruits.

Significantly maximum shelf-life of mango fruits (18.33 days) was recorded with T<sub>6</sub> *i.e.* coating with aloe vera gel 60% and it was at par with T<sub>5</sub> *i.e.* 17.67 days, whereas minimum shelf-life of 12.17 days was recorded with T<sub>3</sub> *i.e.* coating with waxol 6%. This might be due to aloe vera gel coated fruits had better quality and minimum spoilage per cent, reduced degradative metabolism in terms of catalase and PME activities are helpful in extending the shelf-life of the fruits. The result is in line with the result obtained by Molla *et al.* (2011) who studied on postharvest changes in mango.

## CONCLUSIONS

From the present study it can be concluded that fruits coated with waxol 6% had minimum PLW with a maximum fruit firmness and average number of days taken for ripening, whereas the fruits coated with 60% aloe vera gel recorded minimum spoilage with maximum marketability percentage and thereby as it decreased the rate of respiration (Grierson, 1987). These results are in line with findings of Yuniarti and Suhardi (1992) who observed lower weight loss in case of wax treated mangoes as compared to control.

In terms of firmness of fruit maximum fruit firmness (5.17 kg/cm<sup>2</sup>) was obtained in fruits coated with waxol 6% up to 16<sup>th</sup> day of storage and this might be due to reduction in cell wall loosening and respiration which in turn increased the cell integrity in waxol coated fruits whereas fruits under control condition resulted in minimum fruit firmness (2.03 kg/cm<sup>2</sup>) which might be due to increased storage period resulting in loss or degradation of pectic enzymes which in turn reduce the firmness of fruit. These results are correlated with findings of Ladaniya and Sonker (1997) who reported maximum retention on natural freshness and firmness when fruits were waxed and stored for up to 21 days of storage in case of Nagpur Mandarin.

Significantly the highest average number of days taken for ripening (11.20) was recorded with T<sub>3</sub> *i.e.* coating with waxol 6% and it remained at par with T<sub>2</sub> *i.e.* coating with waxol 4% (11.10 days), while (T<sub>10</sub>) control took significantly minimum number of days *i.e.* 6.67 for ripening as compared to rest of the treatments. The delay in ripening of the fruits was due to the fact that it slowed down the process of ripening by retarding the pre-climacteric respiration rate and ethylene production. These results are in consonant with results obtained by Majumdar *et al.* (1981) and Khader (1989) in mango.

In case of marketability percentage of fruits aloe vera gel 60% (T<sub>6</sub>) showed maximum marketability on 8<sup>th</sup>, 12<sup>th</sup> and 16<sup>th</sup> day after storage *i.e.* 1.45, 1.03 and 0.72%, respectively which was at par with T<sub>4</sub> and T<sub>5</sub> *i.e.* 1.30% on 8<sup>th</sup> day of storage; T<sub>4</sub>, T<sub>5</sub>, T<sub>7</sub>, T<sub>8</sub> and T<sub>9</sub> *i.e.* 0.96, 0.96, 0.85, 0.89 and 0.92% on 12<sup>th</sup> day of storage and T<sub>4</sub>, T<sub>5</sub>, T<sub>8</sub> and T<sub>9</sub> *i.e.* 0.68, 0.68, 0.61 and 0.65 on 16<sup>th</sup> day after storage, respectively. However, fruits coated with waxol 6% (T<sub>3</sub>) recorded significantly minimum marketability percent *i.e.* 0.68, 0.37 and 0.02% on exhibited a maximum shelf life (18.33 days).

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## APPENDICES

**Table 1: Effect of Different Coating Treatments on Physiological Weight Loss, Firmness and Marketability of Mango (*Mangifera Indica* L.) cv. Amrapali**

Treatments	PLW (%)			Firmness (kg/cm <sup>2</sup> )			Marketability (%)		
	8DAS	12 DAS	16 DAS	8DAS	12 DAS	16 DAS	8DAS	12 DAS	16 DAS
T <sub>1</sub> : Waxol @ 2%	5.08	6.59	14.18	11.11	7.12	5.01	56.67 (0.85)	20.00 (0.46)	0.00 (0.02)
T <sub>2</sub> : Waxol @ 4%	4.54	5.46	13.90	11.38	7.33	5.06	53.33 (0.82)	16.67 (0.42)	0.00 (0.02)
T <sub>3</sub> : Waxol @ 6%	2.45	4.41	12.36	11.74	7.35	5.17	40.00 (0.68)	13.33 (0.37)	0.00 (0.02)
T <sub>4</sub> : Aloe vera gel @ 20%	12.39	17.87	23.18	8.51	6.02	3.12	90.00 (1.30)	66.67 (0.96)	40.00 (0.68)
T <sub>5</sub> : Aloe vera gel @ 40%	11.92	17.23	21.57	8.70	6.02	3.15	90.00 (1.30)	66.67 (0.96)	40.00 (0.68)
T <sub>6</sub> : Aloe vera gel @ 60%	11.89	15.04	20.59	8.95	6.52	3.22	96.67 (1.45)	73.33 (1.03)	43.33 (0.72)
T <sub>7</sub> : Sago @ 10%	13.70	19.67	27.32	7.12	5.28	2.93	83.33 (1.15)	56.67 (0.85)	26.67 (0.54)
T <sub>8</sub> : Sago @ 20%	13.21	18.94	26.71	8.02	5.63	3.03	86.67 (1.20)	60.00 (0.89)	33.33 (0.61)
T <sub>9</sub> : Sago @ 30%	13.00	18.83	25.17	8.30	5.63	3.12	86.67 (1.20)	63.33 (0.92)	36.67 (0.65)
T <sub>10</sub> : Control	14.50	20.37	27.80	6.05	4.15	2.03	80.00 (1.18)	53.33 (0.82)	10.00 (0.27)
SEm ±	0.34	0.34	0.53	0.32	0.23	0.12	0.10	0.06	0.05
CD @ 5%	1.01	1.02	1.58	0.94	0.68	0.35	0.29	0.19	0.14
CV %	5.81	4.16	4.36	6.16	6.57	5.87	15.25	14.32	17.89

(Note: The data in the parenthesis contain transformed value under arc sine method of transformation)

**Table 2: Effect of Different Coating Treatments on Physiological Weight Loss, Firmness and Marketability of Mango (*Mangifera Indica* L.) cv. Amrapali**

Treatments	Spoilage (%)			Number of Days Taken for Ripening	Shelf-Life (Days)
	8DAS	12 DAS	16 DAS		
T <sub>1</sub> : Waxol @ 2%	23.33(0.47)	53.33(0.82)	76.67(1.08)	10.17	12.50
T <sub>2</sub> : Waxol @ 4%	26.67(0.54)	60.00(0.89)	83.33(1.15)	11.10	12.33
T <sub>3</sub> : Waxol @ 6%	33.33(0.61)	63.33(0.89)	86.67(1.20)	11.20	12.17
T <sub>4</sub> : Aloe vera gel @ 20%	3.33(0.21)	36.67(0.65)	56.67(0.85)	8.83	17.00
T <sub>5</sub> : Aloe vera gel @ 40%	3.33(0.21)	33.33(0.61)	53.33(0.82)	9.06	17.67

Table 2: Contd.,					
<b>T<sub>6</sub>: Aloe vera gel @ 60%</b>	3.33(0.21)	23.33(0.50)	50.00(0.78)	9.50	18.33
<b>T<sub>7</sub>: Sago @ 10%</b>	6.67(0.26)	40.00(0.68)	66.67(0.96)	7.87	16.00
<b>T<sub>8</sub>: Sago @ 20%</b>	6.67(0.26)	30.00(0.58)	60.00(0.89)	8.20	16.33
<b>T<sub>9</sub>: Sago @ 30%</b>	3.33(0.21)	26.67(0.54)	56.67(0.85)	8.53	16.67
<b>T<sub>10</sub>: Control</b>	13.33(0.35)	46.67(0.75)	73.33(1.04)	6.67	13.33
<b>SEm ±</b>	0.08	0.08	0.07	0.21	0.38
<b>CD @ 5%</b>	0.24	0.22	0.20	0.63	1.12
<b>CV %</b>	42.66	19.29	12.15	4.04	4.32

(Note: The data in the parenthesis contain transformed value under arc sine method of transformation)

